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(a) determining an expression for an expected gain of said array, said expression being dependent on said weights assigned to each variable representing an input from a microphone, and

(b) maximizing said expression,

wherein said expression also contains variables representing a variance of magnitude fluctuations from inputs from said microphone and a variance of phase fluctuations from said inputs from said microphone.

33. A method as in claim 32 wherein said expression is

$$E\{G(\omega)\} = \frac{e^{-\sigma_p^2}(W_0{}^H R_{ss}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0{}^H diag(R_{ss}(\omega))W_0)}{e^{-\sigma_p^2}(W_0{}^H R_{nn}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0{}^H diag(R_{nn}(\omega))W_0)}$$

where

$E\{G(\omega)\}$ is the expected gain,

σ_m^2 is the variance of the magnitude fluctuations due to microphone tolerance,

σ_p^2 is the variance of the phase fluctuations due to microphone tolerance,

R_{ss} is a signal correlation matrix,

R_{nn} is a noise correlation matrix,

4H cont

W_o is a nominal value vector of weights assigned to each microphone in the array.

34. A method as in claim 33 wherein step (b) is accomplished by setting the vector W_o equal to the eigenvector which corresponds to the maximum eigenvalue of the symmetric matrix

$$A^{-1}B$$

where

$$A=\left(e^{-\sigma_p^2}R_{nn}(\omega)+\left(1-e^{-\sigma_p^2}\right)diag(R_{nn}(\omega))\right)$$

and

$$B=\left(e^{-\sigma_p^2}R_{ss}(\omega)+\left(1-e^{\sigma_p^2}+\sigma_m^2\right)diag(R_{ss}(\omega))\right)$$

35. A diffracting structure as in claim 1, wherein signals from said microphones are processed using the following method:

(aa) determining an expression for an expected gain of said array, said expression being dependent on weights assigned to each signal from a microphone in the array, and

(ab) maximizing said expression,

Cont A1

wherein said expression also contains variables representing a variance of magnitude fluctuations from inputs from said microphone and a variance of phase fluctuations from said inputs from said microphone.

36. A diffracting structure as in claim 35 wherein said expression is

$$E\{G(\omega)\} = \frac{e^{-\sigma_p^2}(W_0{}^H R_{ss}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0{}^H diag(R_{ss}(\omega))W_0)}{e^{-\sigma_p^2}(W_0{}^H R_{nn}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0{}^H diag(R_{nn}(\omega))W_0)}$$

where

$E\{G(\omega)\}$ is the expected gain,

σ_m^2 is the variance of the magnitude fluctuations due to microphone tolerance,

σ_p^2 is the variance of the phase fluctuations due to microphone tolerance,

R_{ss} is a signal correlation matrix,

R_{nn} is a noise correlation matrix,

W_o is a nominal value vector of weights assigned to each microphone in the array.

37. A diffracting structure as in claim 36 wherein step (ab) is accomplished by setting the vector W_o

A1 cont'

equal to the eigenvector which corresponds to the maximum eigenvalue of the symmetric matrix

$$A^{-1}B$$

where

$$A = \left(e^{-\sigma_p^2} R_{nn}(\omega) + \left(1 - e^{-\sigma_p^2}\right) diag(R_{nn}(\omega))\right)$$

and

$$B = \left(e^{-\sigma_p^2} R_{ss}(\omega) + \left(1 - e^{\sigma_p^2} + \sigma_m^2\right) diag(R_{ss}(\omega))\right)$$

B

38. A diffracting structure as in claim 29, wherein signals from said microphones are processed using the following method:

(aa) determining an expression for an expected gain of said array, said expression being dependent on weights assigned to each signal from a microphone in the array, and

(ab) maximizing said expression,

wherein said expression also contains variables representing a variance of magnitude fluctuations from inputs from said microphone and a variance of phase fluctuations from said inputs from said microphone.

39. A diffracting structure as in claim 38 wherein said expression is

A1 cont'd

$$E\{G(\omega)\} = \frac{e^{-\sigma_p^2}(W_0^{\,H}R_{ss}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0^{\,H}diag(R_{ss}(\omega))W_0)}{e^{-\sigma_p^2}(W_0^{\,H}R_{nn}(\omega)W_0) + \left(1 - e^{-\sigma_p^2} + \sigma_m^2\right)(W_0^{\,H}diag(R_{nn}(\omega))W_0)}$$

where

$E\{G(\omega)\}$ is the expected gain,

σ_m^2 is the variance of the magnitude fluctuations due to microphone tolerance,

σ_p^2 is the variance of the phase fluctuations due to microphone tolerance,

R_{ss} is a signal correlation matrix,

R_{nn} is a noise correlation matrix,

W_o is a nominal value vector of weights assigned to each microphone in the array.

40. A diffracting structure as in claim 39 wherein step (ab) is accomplished by setting the vector W_o equal to the eigenvector which corresponds to the maximum eigenvalue of the symmetric matrix

$$A^{-1}B$$

where

$$A = \left(e^{-\sigma_p^2}R_{nn}(\omega) + \left(1 - e^{-\sigma_p^2}\right)diag(R_{nn}(\omega))\right)$$

and

$$B = \left(e^{-\sigma_p^2}R_{ss}(\omega) + \left(1 - e^{\sigma_p^2} + \sigma_m^2\right)diag(R_{ss}(\omega))\right)$$